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to undertake a secret mission to Italy, which he conducted to the satisfaction of the ministers. On his return he was created a British peer under the title of lord Macartney of Packhurst in Surrey. While he was absent in Italy he was also appointed governor of the Cape of Good Hope, which had surrendered to the English in September 1795. His administration here was marked by the same system of public economy, the same steady perseverance, and the same disinterestedness which had marked his character in every former situation. While he remained there he was beloved, and regretted on his departure. The only unpleasant circumstance which occurred was a mutiny in the squadron stationed there. At first it was appeased, but on the arrival of some other vessels it broke out again in a more formidable shape. As there appeared no prospect of its yielding to gentle means, lord Macartney determined to bring it at once to an issue. For this purpose, he repaired with his aid-de-camps to the battery, ordered the guns to be loaded, and the shot to be heated in the ovens, and taking out his watch he dispatched a message to the mutineers, that if they did not make an unconditional submission in half an hour, and hoist the royal standard in token of obedience, he would blow them out of the water. The threat had its effect, and order was immediately restored.

This was his last public employment. After his return in 1799, he spent the remainder of his life in retirement. The last six years of his life were much embittered by violent and reiterated attacks of the gout; but in the intervals he seemed to enjoy with great relish the society of his friends. His house was the resort of every distinguished character; persons of all parties courted his society and conversation. In 1805 his constitution visibly declined, he entirely lost his appetite and rejected all kind of food. In this state, the unfortunate turn of affairs on the Continent, and the death of Mr. Pitt, threw a considerable damp on his spirits.— Yet still hopes were entertained by the physicians; and three days before his death he was able to read the whole of the budget brought forward by the new chancellor of the exchequer, whom he pronounced to be a promising young man. On the evening of the 31st of March 1806, while reclining his head on his hand, as if dropping into a slumber, he sunk into the arms of death, without a sigh or struggle. His remains were deposited in the church-yard of Chiswick according to his own desire, near a residence he had a few years before purchased for the joint lives of himself and lady Macartney, and in the improvement of which he took great pleasure.

USEFUL INVENTIONS.

COAL-GAS LIGHT.

Description of an Apparatus for producing Inflammable Gas from Pit Coal; constructed by Mr. S. Clegg, Steam Engine Manufacturer, Manchester.

Trans. Soc. Arts, vol. 26.

THE Apparatus which Mr. Clegg has described in his communication to the Society for the encouragement of Arts, Manufactures, &c. is designed for producing gas to light manufactories on a large scale.

The cast iron retort, or vessel in which the coals are put to produce the

gas, is of a cylindrical form, and is inclosed horizontally in a brick fireplace, with one end opening outwards, in a similar manner to the iron ovens in common use; a semi-cylinder of cast iron is placed beneath it, to preserve it from being injured by the intensity of the fire, and to make the heat more equable; the grate for the fire extends inwards about one-third of the length of the retort, and the flame, after circulating over it, passes upwards through a flue above the front part of the retort: it is supposed that the cast iron shield placed beneath the retort, joins the brick-work at each side,

though this circumstance is not stated in the description, because this would be necessary to make the flame pass on round the further end of the retort; the mouth of the retort is closed by a lid ground to fit it air tight, which is fastened by a screw in the centre (but what this screw turns in, to draw the lid close, is not mentioned). Near the retort, a well or pit is sunk, and filled with water, for the gas-holder, or vessel for equalizing the delivery of the gas to move in; this gas-holder is made of wrought iron plates, and is counterpoised by two weights, acting by chains, passing over pulleys fixed in a frame at a due height above; it is of a cylindrical shape, and has two frames of iron, formed like coach-wheels, placed at its extremities, to strengthen it. A vessel of cast iron is placed at the bottom of the well, into which the gas passes by a pipe that proceeds from the upper part of the retort, and in it deposits the tar oil, &c. which occasionally are pumped up from it by a pipe that rises above the well; from this vessel the gas rises upwards by a straight pipe, into an inverted vessel, closed at top, but open below, most part of which is below the surface of the water, where it is pierced with numerous small holes, through which the gas presses outwards, through the water, and rises up into the gas-holder: this inverted vessel is about eighteen inches diameter, and two feet long, in a large apparatus; it causes the gas to be washed in the most effectual manner, and prevents all danger of the water being drawn into the condenser, on cooling the retort, as might happen if the gas pipe terminated in the water. The gas at the lower part of the gas-holder not being so pure as that at the top, it is made to pass from the top alone by a vertical pipe in the centre, which rises and falls with the gas-holder, and reaches from the upper part to the water, and passes over a fixed pipe, rising from a second vessel at the bottom of the well (represented in the plate, but not mentioned in the description) from whence another pipe ascends close by the side of the well, to convey the gas to the lamps, where it is burnt. The gas enters the moveable pipe through small holes near its top, and is from thence conveyed

through the other pipes last described. The seams of the gas-holder are luted to make them air-tight, and the whole is well painted, inside and out; it is sunk to a level nearly with the top of the well, before the retort is heated, but when the gas comes over on applying the fire, it gradually rises, and moves higher or lower, according as the gas is produced more or less abundantly.

The lamps in which the gas is burned, are formed in the same manner as Argand's lamps; the gas passes into the space between their inner and outer tubes, by a pipe at one side; a flat ring closes the upper part of each, which is perforated with a number of small holes, through which the gas rises to the flame, surrounded by a glass funnel; a small stopper, like a button, is placed so on the top of a vertical wire within the glass, that it may be brought nearer or farther from the aperture of the internal tube by which the air passes, and regulate the velocity and direction of its current; for which purpose the wire slides upwards through two cross bars placed across the inner tube. This little addition is found to assist the combustion very much, and increase the light.

The dimensions of the apparatus are not mentioned in the description, but assuming the length of the inverted vessel as a standard, which is the only part whose capacity is noted in any case, the proportions of the different parts, as taken from the plate, will be thus: the gas-holder six feet in diameter, and $6\frac{1}{2}$ feet high; the retort about five feet long, and $1\frac{1}{2}$ in diameter; the first condenser two feet in diameter; the second immersed vessel $1\frac{1}{2}$ in diameter; and the inverted vessel, or gas-washer, two feet long, and about one foot broad; the pulleys over which the chains work, which raise the gas-holder, $1\frac{1}{2}$ feet in diameter, the well 7 feet deep, the flue of the chimney 9 inches across, and the space between the retort and the brick-work 6 inches, except over the fire-place, which is 18 inches long, and 10 deep.

Remarks on this Apparatus, extracted from the Athenæum.

Mr. Clegg's communication has the

merit of being the first complete description of an apparatus of English construction, for producing coal gas, which has yet been made public, from which one might be made, without leaving the formation of any part to conjecture; with the exception of the mode in which the screw is to be applied for fastening the lid of the retort.

The gas-holder alone, in this apparatus, seems objectionable, in being made needlessly strong, as is stated to be formed of wrought iron plates, and is besides strengthened by two very powerful iron frames inside, when it is not liable to any great pressure internally or externally, or to any friction, which would require all this strength. For a common apparatus, on a small scale, a cask would probably do very well for this part, as the water with which it would be always in contact would keep it staunch.

An Account of the Method of Cultivating the American Cranberry, by the Right Hon. Sir Joseph Banks.

Trans. Hist. Soc. p. 2.

The American Cranberry, *Vaccinium Monocarpium*, has succeeded remarkably well at Spring-grove, under the management of Sir Joseph Banks.

It is cultivated on an artificial island in a basin, and on the banks of a pond at Spring-grove, which are supplied by a spring that rises in a small grove on the grounds, from which the place probably derives its name: to this constant supply of fresh water, though it is but small, the great luxuriance with which water-plants of all kinds suitable to the climate succeed in the pond, is to be in a great degree attributed.

In the middle of the basin a small island has been formed, by supporting a box of oak upon posts driven into the bottom; this box is 22 feet in diameter, and 13 inches deep; the bottom lies 5 inches under the surface of the water, and is bored through with many holes; on this a layer of stones and rubbish was first placed, and upon that a covering of bog earth from Hounslow Heath, which together are at the bottom 5 inches under the surface of the water, and 7 inches above it at the top; in this bed of black mould a variety of curious bog plants were placed about seven years

ago, which flourished in an unusual degree; among them was the *Vaccinium*, which flowered and ripened its fruit the first year. In the Autumn of the second year it again produced a plentiful crop, and soon after began to send out runners somewhat resembling those of a strawberry, but longer, and rather less inclined to take root while young; they did, however take root in the winter, and threw out upright branches, ten inches or a foot long, on which the flowers and fruit were chiefly placed; the produce was this year gathered, and found to be flavoured berries, very superior to those imported, which have in general been gathered unripe, and have become vapid and almost tasteless, by long soaking in the water in which they are packed for carriage. It was now determined to give up the whole of the island to the cranberry, which in a few years entirely covered it by its runners, without any fresh plants being added; and this bed, with the addition of some hanging boxes, receding from the center to the sides, produced, in 1806, twenty-three bottles of very fine cranberries.

In 1805, a bed was made on the side of the pond, 20 feet long, and $5\frac{1}{2}$ feet wide, by a few stakes driven into the bottom, parallel to the sides, and lined with old boards; the bottom of this was filled with stones and rubbish, and on these a bed of black mould was laid, extending 3 inches above, and 7 inches beneath the usual surface of the water; this was planted with cranberry plants from a hot-bed, where many of them rooted, and thrived most vigorously. In the Autumn of 1807, this bed produced a crop, which, added to that of the island, afforded five dozen bottles of cranberries, besides a small basket for present use.

The total contents of the two cranberry beds is 326 square feet; the quantity of land employed for raising strawberries at Spring Grove is, after deducting the divisions between the beds, 5645 feet; the beds necessary to give a sufficient supply of cranberries for Sir Joseph's family, did not therefore occupy quite an eighth of the space allotted to the strawberries.